SEP 26 1941

Gas Journal

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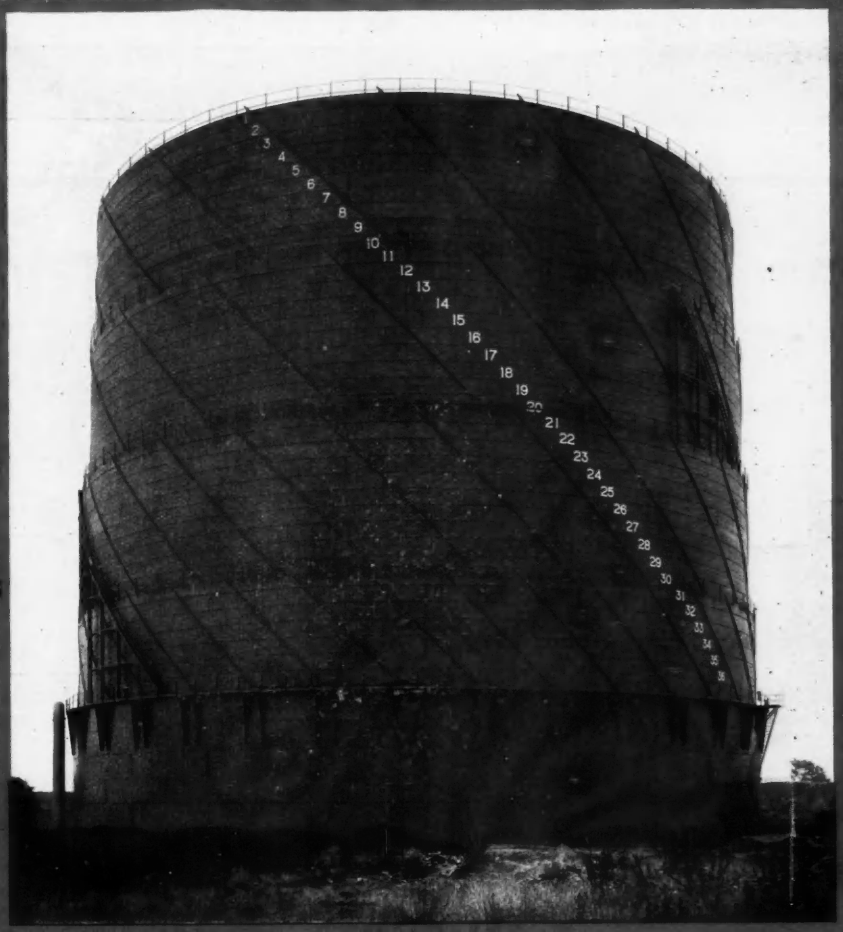

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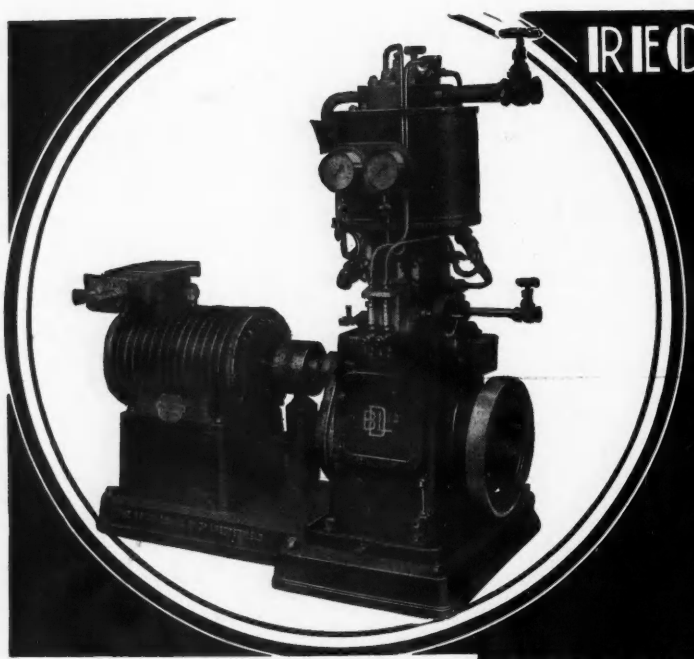

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GAS JOURNAL, AUGUST 27, 1941

VOL. 235 93rd YEAR No. 4084

EDITORIAL NOTES

PREPARING FOR THE FUTURE

IN a general comment on the annual meeting of The Institution of Gas Engineers we said in the "JOURNAL" of June 18 that the keynote was consideration of how to plan to the best advantage for the future of the Gas Industry. Some of the Gas Industry's problems—major ones—were concisely stated and they have been extensively discussed; and the opinions expressed by the Authors in their Papers presented at the meeting have been well and truly endorsed. We ended our comment on June 18 by asking, in the words of Dr. E. W. Smith in the verbal discussion at the meeting: "What are we going to do about it," for with such unanimity of view the Institution meeting constituted the most telling call for action within the Industry that we have known, together with a realization that only drastic re-organization will meet the demands of the future. Words there have been, and in plenty; we now need deeds.

A fortnight ago, in a short note on pooled resources, we hinted that moves were in fact being made in the attempt to bring about within the Industry far greater uniformity of policy and practice. We are now in a position to expand at any rate a little on one of these moves which has crystallized into shape during the past few weeks following the Institution meeting. The Council, we are able to inform readers—and we have lively satisfaction in doing so—has already set up four small Committees of Enquiry. We are aware of the personnel of these Committees and believe they are exceedingly well fitted for the tasks allotted to them. The four small Committees—each of which comprises three members only—will deal with the following subjects: To ascertain what is the most suitable quality of gas, from all aspects, for supply to consumers in Great Britain. To enquire into and make recommendations on the removal of sulphur from town gas; on the standardization of consumers' appliances; and on coke grading and on its properties. The other subjects dealt with at the meeting have also been reviewed and it has been decided to give them consideration in the near future. We may recall that they were industrial uses of gas, grouping of gas undertakings, co-ordination of the carbonizing industries, the future education of gas engineers, and the relation between the Technical Press and the Gas Industry.

Now the Committees appointed will consider not only the material contained in the several Papers and the discussions to which they gave rise, but also further evidence and expressions of opinion from all interested parties; and the Chairmen of the Committees invite all those who may wish to submit their views on the subjects to send, as soon as possible, four copies of a *précis* of their evidence to the Secretary of the Institution. We trust, though we have not been informed on this point, that a time limit will be set to the gathering of evidence and the making of recommendations. To our mind it should not be difficult to make strong recommendations without much delay regarding the four important matters which have been over many years continuously ventilated, and opinions on which would appear to be in such general agreement. We welcome this move of the Institution to grapple with the situation—a situation which must be faced if the Industry is to prosper in post-war years. But what we do insist upon is the need for establishing machinery for putting into effect, practical effect, the recommendations made. This, to our mind, is the major problem confronting the Industry. Committees of investigation are, of course, necessary, but they are of little use unless their findings can be submitted to an authoritative body which can ensure action. The crux of this aspect of the matter is whether there really exists such a body in the present structure of the Industry. Far too many past committee recommendations lie dusty on the Industry's shelves. While the committees collect their evidence, let us go ahead with this major problem.

CO-ORDINATION

WE have written at some length during recent weeks on the Papers and the discussion on them, both verbal and written, at the annual meeting of The Institution of Gas Engineers, but have not referred specifically to the Symposium Paper by Dr. G. E. Foxwell. That Paper, it appeared to us, was a summation of the main ideas and suggestions put forward from time to time during recent years by the Author in Papers either by himself or jointly with others to various technical bodies. It crystallized those suggestions clearly and with firm emphasis on the dominant note of co-ordination of the carbonizing industries from within as a preliminary to co-ordination from without. Dr. Foxwell has had experience—and quite intimate experience—of both the Gas Industry and the Coke Oven Industry, and his laboratory work is well known. With some of the opinions he has expressed in the past many no doubt have disagreed and will continue to disagree, but there can be little to find fault with in his present Paper regarding this paramount need for effective co-ordination and co-operation and abandonment of the isolated small-unit principle. That principle must go by the board. The immediate task, war or no war, is to make sure that it disappears quickly; otherwise the Gas Industry will find itself quite incapable of meeting post-war conditions, or even of satisfying conditions arising during the war period.

When we say that it seemed to us that there was little new about Dr. Foxwell's Paper, this implies no disparagement of its worth. We could say the same about the other Symposium Papers and we feel quite sure that the Authors would be the first to agree with us. The Papers briefly set out a series of problems facing the Gas Industry and equally briefly put forward recommendations for their solution—and solved they must be, rapidly and actively. Arguments on the pros and cons of, for example, standardization of calorific values and of appliances and gas pricing policies seem to us to be unnecessary at this stage. What is needed is action, and, we reiterate, if truculent undertakings will not come into line for the common good and their own progress and prosperity, they must by some means be made to adhere to majority-accepted plans. The greatest weakness of the Gas Industry in the past (and it is the greatest weakness of the Industry to-day) has been that no body has had the authority to do more than recommend gas undertakings to carry out proposals designed, after careful thought, for their welfare. The carrying-out of these proposals has been fairly but by no means entirely satisfactory; translation of idea into practice has been too haphazard and happy-go-lucky.

We would be the first to admit that a good deal of progress towards internal co-ordination of the Gas Industry has been made during the past decade; emphatically, however, it has not gone far enough. The same applies to co-operation between the Industry and other carbonizing and fuel interests, including the supplier of the raw material, the coal industry. In many parts of the country—notably in the South, through the operation of the London and Counties Coke Association—coke marketing problems have been or are being largely solved; but it is apparent, as Dr. Foxwell contends, that the future must see far closer co-operation between the Gas and Coke Oven Industries. A factor influencing this co-operation is that some coke ovens are tied to steel works, while others work independently, capable at

will of meeting the demands of the industrial or the domestic market. The supply of furnace coke, as the Author said, is the business of the coke ovens, and there must at all times be adequate capacity reserved for the iron and steel industry. There is the difficulty in ordinary times that coke is taken off or thrown on to the general market according to the demands of the furnaces; but we share his view that by co-ordination between the iron and steel industry, the coke oven industry, and the Gas Industry the essential outputs of coke for all purposes could be maintained at all times and the markets for coke could be very greatly extended. In this connexion we would call attention once again to the importance of pursuing, as the Gas Research Board is pursuing, investigations into the complete gasification of coal. Regarding this the remarks of Mr. E. V. Evans at the recent L.C.C.A. luncheon, referred to in these columns a fortnight ago, are particularly apposite. The complete gasification process at present being investigated, he observed, "is designed to deal with additional gas business and to regulate the quantity of coke made so that the coke available shall be placed on the most suitable and remunerative market." The future does hold great possibilities, but, as Dr. Foxwell said, "these can only be fully grasped if the carbonizing industries unite as a co-ordinated whole to produce and sell the manufactured fuels required by domestic consumers and by commercial and industrial concerns."

GAS FOR MOTOR TRANSPORT

IT will be recalled that in November of last year the British Commercial Gas Association issued a list of low-pressure gas filling stations for motor transport. The Association now asks members to notify it of any alterations and additions to the list, so that an up-to-date list can be compiled. We hope there will be a ready response to this request, for there is no doubt that, in view of the cuts in the supplementary and basic rations of petrol, an increased interest is being shown in gas for transport—and not only gas, but also solid fuels, including coke, suitable for use in mobile producers. That this interest is being displayed is shown by the leading article in the current issue of the *Service Station*, in which issue, by the way, is published part of an Address given by Mr. D. C. Gunn, of the Leeds Gas Department, on town gas as a motor fuel. The Address was given before the Motor Agents' Association in Leeds.

Our contemporary urges its readers once again to consider very seriously the possibilities of the present situation, pointing out that unless the service man is prepared to supply, fit, and re-fuel producer-gas driven vehicles and install a gas supply point for refuelling gas bags, the business will pass to other traders. In October of 1939 it was made clear that gas used for motor transport would not be subject to rationing restrictions, and not long afterwards the London Gas Development Association (the gas undertakings concerned being the Gas Light and Coke, the South Metropolitan, the Wandsworth, the South Suburban, the Tottenham, the Croydon, and the Lea Bridge) announced that standardization had been reached in the matter of gas price and garage filling charges, and also in regard to the filling point attached to the gas bag. And at the time the point was stressed that the gas undertakings in the area had not the slightest wish to compete with the automobile industry in affording supplies of gas for private cars and commercial vehicles. In fact, the aim was to foster the co-operation and active support of the automobile engineer. The *Service Station* mentions that gas supply undertakings have set up supply points at their own works or holder stations and that the nucleus for the national distribution of town gas to motorists exists ; and it also recalls the offer of the London gas undertakings shortly after the outbreak of war to co-operate with motor traders in the installation of filling points on their premises.

It is the opinion of the *Service Station* that early in the war gas undertakings and other interests largely lost the opportunity then presented of pushing gas and coke as alternatives to petrol. We quote from our contemporary: "Producer gas plant manufacturers and the large gas supply undertakings have, it is true, done a little towards creating a demand for their new petrol alternatives, but generally speaking they failed to convince the motor trader that their schemes were of any real importance, and *certainly did little or nothing to create any practical interest among the motorists*." The italics are ours. Having pointed to the comparatively small cost of changing over a car from petrol to town gas, and the improvements now available in the method of carrying the fuel, our contemporary expresses the view that the scope is considerable—but that gas undertakings must create the demand among motorists and that the service man must set up the refuelling facilities in his own premises. We have discussed the limitations of low-pressure gas for motor transport. The mileage range a single filling affords is relatively small, and the time needed to fill a bag with gas is, compared with the time taken in filling a tank with petrol, long. The system is simple, though, and it is a means of keeping motor vehicles in service.

This point looms larger now than ever, and the Gas Industry has a second opportunity of explaining to the motorist and the automobile engineer what can be done in the matter. The essential factor in the development of the scheme is, however, once again adequate supplies of coal to gas undertakings. Without such supplies this scheme and other schemes of national importance must fail.

CONTRACTORS TO REGISTER

GAS undertakings and the constructional and contracting side of the Gas Industry come within the scope of the compulsory registration of building and civil engineering contractors provided for in Defence Regulation 56AB (S.R.&O. 1941, No. 1038) to enable the Ministry of Works and Buildings to make a comprehensive survey of the building and civil engineering industries, and to see that their resources are used to the best advantage in the national interest. All public utilities, in common with the humblest village house decorator and the largest public works contractor, must register with the Ministry by Sept. 1; after Oct. 1 no contractor will be able to carry on business without a certificate of registration. In applying for registration, contractors must undertake to observe terms and conditions of employment neither more nor less favourable than those fixed by joint agreement in the Industry or by arbitration, not to permit Sunday work except in emergencies or certain specified circumstances, and not to work more than 60 hours per week.

What precise use will be made of the register when it is completed has not yet been announced, but obviously it will form the basis of some kind of co-ordination of effort and elimination of wasteful overlapping of overwork and unemployment, unequal distribution of plant, movement of labour, and transport of materials. There will most probably be a regional grouping of contractors and a pooling of the resources of the smaller firms, not only to save them from extinction, but to enable them, by means of more adequate equipment and better planned labour distribution, to undertake work which the bigger contractors are too busy to entertain. Whatever the outcome of the register, the Ministry anticipates that the Gas Industry will be in no less favourable a position than at present, for although there may be some regional limitations for general work, there will still be freedom of movement for contractors engaged in the more highly specialized branches of the Industry. The open tender system will still operate, even if, in the case of work that can be done equally well by firms within a given area, there is some limitation of the radius from which tenders may be accepted.

Clearly no one in these days would want to transport a gang of men from, say, Leicester to Carlisle, to do a job that could be done just as well by men whose homes are in the district and who are probably standing about waiting for work. Actually in some branches of gas-works contracting there is already an understanding between firms not to tender for work in each other's territory, and it is quite conceivable that this friendly attitude might be extended to other fields in order to achieve voluntarily what might otherwise become compulsory. The Defence Regulation under which the register is being compiled is, of course, purely a wartime measure, but, properly applied, the register will assist the Gas Industry to plan not only for the immediate future, but for the handling of a great many of those post-war problems that were the subject of such helpful

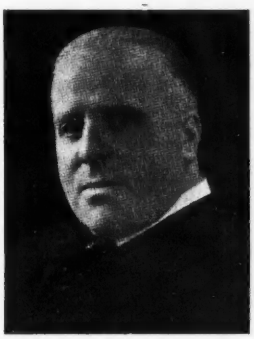
discussion at the June meeting of The Institution of Gas Engineers. Designed to develop a maximum war effort, the Regulation visualizes only the execution of building and civil engineering contracts that are of urgent national necessity, but when the war ends there will be a big accumulation of development work waiting to be done, and the Gas Industry will be the better able to cope with it if it utilizes the present opportunity of cutting out unnecessary overlapping.

Personal

Mr. J. Sandon Stubbs

At a meeting of the Board of Directors of the Liverpool Gas Company on Aug. 18 it was agreed that Mr. J. SANDON STUBBS shall retire from the Company's service on Sept. 30 next.

Mr. Stubbs is known personally to many thousands of gas consumers in Liverpool and district and will be greatly missed by the staff of the Company, by whom he is held in high esteem. During his fourteen years as Secretary and Treasurer he has constantly advocated the cause of better service to the consumers, and with this object always before him, he convinced the Directors of the necessity of building Radiant House. Many are the distinguished visitors who



MR. J. SANDON STUBBS.

MR. C. R. LEACH.

have been shown round this magnificent building, which was erected as a direct result of the persistence of Mr. Stubbs, and under his guidance the Company has formed a strong alliance with housewives, who now speak not of "the gas office," but of Radiant House.

Mr. Stubbs is well known throughout the Gas Industry as a "progressive." For several years he was Chairman of the Manchester and District Branch of the British Commercial Gas Association, and is a member of the Executive Committee of that body and of the British Gas Federation. In addition to his commercial activities, he has always been a keen social worker, and is at present Honorary Treasurer of the Child Welfare Association.

Mr. Stubbs joined the Liverpool Gas Company in 1893, and became successively Registrar, Deputy Treasurer, and Secretary and Treasurer in 1927. Three years ago he was appointed a Magistrate of the City of Liverpool.

His successor is Mr. CHARLES R. LEACH, M.A.(Oxon), A.C.A., a native of Manchester, who attended the Grammar School there, proceeding to Oxford, where he had a distinguished career, graduating with honours in mathematics. Mr. Leach, who is 40 years of age, is well versed in the affairs of the Gas Industry, for after serving his articles with the Manchester firm of W. Bolton & Co., he was Assistant Secretary to the Alliance and Dublin Consumers Gas Company from October, 1927, until he went to Liverpool in 1939.

* * *

A presentation to Mr. W. A. HOWIE, Engineer and Manager of the Gravesend Gas Company, who has taken up his duties as Engineer and Manager at Maidstone, was made on Aug. 15.

Mr. W. A. Hammond, in making the presentation of a canteen of cutlery on behalf of the officers and employees, spoke of the esteem and affection in which Mr. and Mrs. Howie were held by them all. Mr. Howie said how much he felt the parting after having had such loyal and faithful service from all the employees and consideration and kindness from the Chairman and Directors during his 17 years of happy connexion with the Company.

* * *

Mr. O. R. S. INGHAM, who has been Assistant at Gravesend for 12 years, has been appointed Acting Engineer and Manager following Mr. W. A. Howie's appointment to Maidstone.

* * *

Mr. H. C. WILSON-BENNETTS has been appointed a Director of General Gas Appliances, Ltd., Audenshaw, near Manchester.

* * *

Mr. T. W. DODDS, for many years Engineer and Manager of the Horncastle Gas Department, has resigned, as from Sept. 30, on account of ill-health. He will be succeeded by his son, whose initials are the same as those of his father.

Mr. A. MURRAY, whose appointment as Manager at Amble we announced on Aug. 6, was not Manager at Aberlady as stated, though he had been on the staff of the Company. Mr. R. S. Taylor is, of course, Manager there.

North British Association of Gas Managers

The Annual General Meeting of the Association will be held in the North British Station Hotel, Edinburgh, on Friday, Sept. 5, when Mr. Dean Chandler, of the South Metropolitan Gas Company, will deliver the William Young Memorial Lecture.

Luncheon will be served at 1 p.m., tickets 5s. 6d. each.

A Golf Competition, under handicap rules, in aid of Red Cross Funds, will take place over the Royal Burgess Golfing Society's Course, Barnton, on Thursday, Sept. 4; also on Thursday, Sept. 4, by courtesy of the Whitehouse and Grange Bowling Club, a Bowling Competition in aid of Red Cross Funds will take place on the Green of the Club, Hope Terrace, Edinburgh, at 2 p.m.

Scottish Junior Gas Association (Eastern District)

At the Annual General Meeting of the Association the following appointments were made for Session 1941–42:

President: S. G. Melville, Edinburgh.

Vice-President: T. B. Livingstone, Hamilton.

Hon. Secretary and Treasurer: J. F. Wilson, Perth.

Council: W. Nicol Baird, Perth (*ex officio*), Wm. Carson, Edinburgh, A. W. Brown, Alloa, A. A. Mitchell, Penicuik, T. A. Ross, Leven, A. McNeil, Hamilton.

Librarian and Education Representative: A. T. Doran, Edinburgh.

Hon. Auditors: H. Darling, Broxburn, and E. L. Farquhar, Kennoway.

The Association were successful in completing their programme of a meeting each month with only one exception, and although attendances were rather low owing to travelling difficulties, it was felt that the effort to carry on had been well worth while, and it was hoped that similar arrangements might be made for session 1941–42. Some twenty of the members are now serving with the Forces, and it has been decided that these members should not be liable for a subscription until their return to civil life.

Society of British Gas Industries

The Council of the Society has again this year awarded prizes in connexion with the Final Examination of the City and Guilds of London Institute in Gas Fitting. The list of awards is as follows:

First Prize of £5 5*s.*: D. C. Soper, a student of Gloucester Technical College.

Second Prize of £2 2*s.*: J. P. Williams, a student of Cardiff Technical College.

Semtex Compounds

Modern developments have opened up a wide field of application in the Gas Industry for materials prepared from specially treated rubber latex, special cements, and various other ingredients, by Semtex, Ltd. (whose proprietors are Dunlop Rubber Plantations, Ltd., and the Limmer and Trinidad Lake Asphalt Co., Ltd.). Positive adhesion to any clean surface, and strong resistance to chemical action and to abrasion, render Semtex materials particularly suitable for use in coke elevator bucket linings, as linings for coke chutes, in purifiers, sulphate of ammonia plants, the de-dusting chambers of steam generating plant, settling tanks, acid cooler bases, and in other gasworks and by-product plant. On de-dusting plants where Semtex compound has been applied both to the de-dusting chamber walls and to the fan blades, very successful results have been obtained over a long period where no other material tried had previously given satisfactory service. Applied to concrete or steel floors, Semtex material gives an excellent non-slip surface, equally good under wet and dry conditions, and this unique property has led to its use with outstanding success for deck and floor coverings in many establishments where a non-slip surface is of special importance in minimizing accident risk to personnel. Semtex materials are also being applied in considerable quantities as pipe jointing (in acid effluent mains, for instance), as a rendering on the walls of inspection pits and manholes, and as a dampcourse. Owing to its good adhesion to non-porous ceramic materials, engineering brickwork may be built in Semtex mortar quite readily, and we are given to understand that the strength of the resulting brickwork is greater than that jointed by ordinary cements. Experiments on new applications of these materials are constantly in progress, and the production manager of Semtex, Ltd., informs us that members of his technical staff are readily available to co-operate in such experiments with firms or undertakings anxious to explore their possibilities.

Watford and St. Albans Gas Company dividends on account of the year ending Dec. 31, 1941, have been declared as follows: At the full half-yearly rate on the 4% Redeemable Stocks (1959 and 1973'78), the 5% Pref., and the 6% Redeemable Pref. (1955); at 2½% on the Ordinary.

THE DESIGN AND LAYOUT OF A RECONSTRUCTED GAS-WORKS*

By F. B. WALLER, *Alloa*

THE Alloa Gas Undertaking has increased its annual ouptut of gas from 20 million cu.ft. in 1887, the first year under municipal management, to 350 million cu.ft. in the twelve months of the financial year 1937–38. Partial reconstructions have, of course, been carried out from time to time, and in 1914 a new installation of Wilson intermittent vertical retorts was installed, replacing the old horizontal retort plant.

At that date, 1914, the output of gas was 150 million cu.ft. per annum, with a carbonizing plant capable of producing ¾ million cu.ft. of gas per diem of a calorific value of 440 B.Th.U. per cu.ft., and a steady increase of output was experienced until in 1936, the annual make was 316 million cu.ft.—an amount which, even with increased steaming in retorts, higher temperatures, and increased throughput of coal per retort, was difficult to maintain.

This latter development of the undertaking was being closely watched by the management, and it was early realized that as existing plant became obsolete it was desirable to replace with new plant of a capacity equal to 2 million cu.ft. of gas per diem, and this chiefly on account of past experience of the development of the undertaking, and the view that there was still an ever-increasing demand for gas for (*a*) domestic purposes; (*b*) industrial use. The industrial load in Alloa is 20% of the total output, and with low rates of charge, ranging from 7.09d. to 4.09d. per therm, further increases were being obtained every year; (*c*) the many villages on the outskirts of Alloa already supplied with gas from Alloa were increasing in size, and as gas mains were being laid into outlying areas it was felt that the adjoining undertakings of Tillicoultry and Alva, with respective outputs of 28 and 40 million cu.ft. per annum, would in all probability be incorporated within the near future. The process of reconstruction was commenced in 1930.

The old wet type station meter erected by Messrs. R. Laidlaw & Sons, Edinburgh, in 1902 and having an hourly rated capacity of 33,000 cu.ft. per hour was replaced by a Connersville meter with a normal rated capacity of 65,000 cu.ft. per hour.

Work was commenced on the dismantling of the old meter on Feb. 1, 1933, and the new meter was erected and put into operation on Feb. 17 of that year. Apart from the small size of the wet meter trouble had been experienced on two occasions, one, at this time, of a broken driving shaft. In considering the respective merits of different types of new meters, the cost was found to be closely similar, but the Connersville type had the advantage in regard to the restricted floor space and height required. This type of meter is also capable of dealing with an overload on normal rated capacity of 100%. The size chosen, 65,000 cu.ft. per hour, is guaranteed accurate to ±1% between 7,000 and 130,000 cu.ft. per hour. The meter is fitted with a pressure, volume, temperature, and time recording instrument and counter reading in cubic feet.

The coke screening plant was erected in January, 1934, to replace the two separate static wire debreezing screens at each of the two outlets from the coke storage hopper. The screen is equipped with travelling wheels running on a pair of longitudinal channels hung from the bottom of the coke hopper, so that it can be run under either hopper outlet. The flow of coke to the screen is regulated by a hand operated slide door. The plant is of the C.C.L. type and consists of batteries of triangular plates rigidly fixed to a series of parallel square shafts, all geared together by independent roller chain drives, and all running at the same speed—viz., 40 r.p.m. At the feed end of the screen the first shaft unit is fitted with circular discs, thus permitting the use of a plain feed chute. The capacity of the plant is 25 tons per hour.

The separate grades of coke are removed as follows:

The first size 0 to ½ in. falls by gravity into a skip wagon and is removed as boiler fuel or to the producer fires as required. The coke nuts—*i.e.*, over ½ in. to 1 in.—are fed by direct discharge on to a reversible belt conveyor, and in this way railway wagons are filled either for sale, or are emptied into the underground hopper for elevation to the overhead hopper for the producers. All coke over 1 in. is discharged straight into railway wagons for sale. This operation can be carried out at either outlet from the hopper, it being only necessary to reverse the travel of the belt conveyor to dispose of the coke nuts.

The main object of this plant was to satisfy the coke consumers by supplying a thoroughly clean and graded coke, and with the minimum of labour.

Prior to the installation the coke breeze was hand-riddled to extract the coke nuts, thus entailing a great deal of labour; the total handling charges per ton of saleable coke is now approximately 6d. per ton.

Condensers

Early in 1936, trouble was experienced by a recurrence of water leaking in the malleable iron tubes of the water tube condenser through which the boiler feed water flowed, prior to being softened in a Permutit base exchange softening plant. The tubes on removal were found to be badly pitted, and on close examination appeared to have been attacked from the inside by the thick deposit of scale found on the tubes. The following is an analysis of the cooling water as used at that time:

Total solids	28.28 grains per gallon.		
Comprising saline residue	26.40	,,	,,
Comprising volatile residue	1.88	,,	,,
Total hardness	18.00 grains per Imperial gallon.		
Comprising temporary hardness	6.5	,,	,,
Comprising permanent hardness	11.5	,,	,,

Much of this hardness is due to the presence of the sulphates and chlorides of calcium and magnesium, and accounts for the scale and pitting of the inside of the tubes.

To overcome this difficulty the 196 2-in. M.I. tubes were removed, also top and bottom C.I. plates, and replaced with 49 3-in. by 19-ft. 10-in. C.I. plates made up in two lengths of 9 ft., and one bottom flanged and socket piece 6 in. effective length and one top flanged and spigot piece of 16 in. effective length. The top and bottom castings were secured to new top and bottom plates by bolted flanges, and all the pipes were secured by rust joints.

Further support was given to the bottom plate from the underside—*i.e.*, the water chamber, by means of 4 M.S. brackets. A substantial saving was effected by this method of repair, for to renew the M.I. tubes would have cost over £200 for the tubes alone, whereas the foregoing work was carried out for approximately £96. The original capacity of the condensers was, however, reduced from 750,000 cu.ft. per diem to 600,000, which resulted in the C.I. atmospheric condensers having to be water sprayed on occasions. This practice of water spraying, however, is not now necessary since the installation of the new vertical retort bench, as the cooling of the gas is helped considerably by an exceptionally long length of foul gas main from the new carbonizing plant, and also due to the introduction of continuous spraying of gas offtakes and foul main of the new plants with ammoniacal liquor.

It was anticipated early in 1935 that the four existing water-sealed purifier boxes were approaching their maximum capacity, and especially in regard to the amount of pressure which the water seals could withstand, due to the increased make of gas. This pressure was only 28 in. water gauge and the immediate remedy was to convert the four boxes to rubber joint type. This was carried out in a most successful manner and in time to take the increased load of the winter of 1936–37, which could never have been otherwise overcome without great inconvenience. The conversion was carried out to one purifier at a time, each box being completely finished and put to work before any alteration was commenced on the next.

The existing lute plates were stripped of each cover and a new 3 in. by 2¼ in. by ⅜ in. angle bolted on to the existing angle curb with cup-headed bolts.

A new 9 in. by 8 in. by ⅝ in. angle cast iron curb was bolted to the upper edge of the cast iron side plates of the boxes. The joints between the angle curb and the side plates were made of millboard soaked in red lead, the corners being mitred and jointed with an angle joint cover on the underside.

The joints between the cover and the new angle curb were made with "D" shaped rubber strips $1\frac{5}{16}$ in. by $1\frac{1}{16}$ in. of patent design, having a ¼ in. dia. steel core bar passing through the centre to prevent sagging of the rubber, and secured to the cover by ¼ in. dia. eyebolts attached to this core bar.

The water lutes attached to the sides of the boxes were retained, as it was thought that the removal would seriously weaken the structure, and certainly would affect the appearance of the finished job. The lutes were therefore filled with grout and finished off with cement plaster. It was also found necessary to increase the seal pots at the Weck valves of the purifiers and also at the Livesey washer and scrubber as the pressure inside the boxes was considerably increased by the increase of gas throughout.

The sulphur content of the spent oxide has been able to be brought up to a maximum of 55% with only two changes, where previously three to four changes were required.

Benzole Plant

The question of installing a benzole extraction and recovery plant was examined in 1935 from every angle. The data of existing conditions of gas manufacture at that period were taken as a basis, as follows:

Gas manufactured per annum (cu.ft.)	240,000,000
Gas made per ton of coal carbonized (cu.ft.)	18,000
Coal carbonized per annum (tons)	13,333
C.V. of gas made (B.Th.U.)	440
Therms per ton of coal carbonized	79.2
Total therms made per annum	1,056,000

* From a Paper to the Scottish Junior Gas Association (Eastern District).

Deductions arising out of Benzole Extraction.

1. Benzole to be extracted from gas per ton of coal (galls.)	2
2. B.Th.U. to be extracted from gas per ton of coal	16.5
3. Therefore calorific value of gas required to be made (B.Th.U.)	456.5
4. Estimated thermal yield per ton of coal due to reduction of use of steam in retorts	72.4
5. Reduced therms per ton of coal by benzole extracted (1.6 therms per gallon of benzole)	3.2
6. Net thermal yield per ton of coal after extraction of benzole (item 4-5)	69.2
7. Make of gas per ton of coal with extraction (cu.ft.)	15,850
8. Total coal required with benzole extraction (tons)	15,260
9. Additional coal required with benzole extraction, p.a. (tons)	1,927
10. Increased quantity of saleable coke per annum (tons)	963
11. Estimated increased coke due to reduced steaming per ton of coal carbonized (cwt.)	0.51
Equal to quantity per annum (tons)	389
12. Total quantity of increased coke made per annum (tons)	1,352
13. Cost of additional coal required per annum at 17/10 per ton	£1,718
14. Revenue from additional coke per annum at 17/- per ton	£1,149
15. Net additional cost of coal per annum equal to per gallon of benzole made	3.70d.
16. Total estimated production of benzole (galls.)	30,500

Operating costs.	*Price per gallon of Benzole (pence).*
1. *Steam.* 60 lb. per gallon of benzole at 1/- per 1,000 lb.	0.71
2. *Water.* 50 gallons per gallon of benzole at 3d. per 1,000 galls.	0.15
3. *Wash Oil Replacement.* 0.10 galls. per gallon of benzole at 5d. per gallon	0.50
4. *Labour. Nil.*	
	1.36
5. *Add*—Additional carbonizing cost, coal less coke	3.70
	5.06
Revenue from benzole at 11d. per gallon	11.00d.
Less cost of production	5.06d.
Net Profit per gallon of benzole	5.94d.
30,000 gallons benzole at 5.94d. per gallon	£755 0 0

As can be seen from the foregoing a sufficiently good case was established for the installation of a benzole extraction and recovery plant, and this was laid down and put to work on Dec. 17, 1935.

The following working results for the year May 16, 1936, to May 15, 1937, clearly prove the success of the venture, which is further emphasized by the balance-sheet showing comparison of working of a gas-works making 300 million cu.ft. of gas with and without benzole recovery.

Benzole Recovery Plant, Year 1936-37.	£ s. d.
Income from Benzole Plant.	
26,820 gallons crude benzole made at average price 10.59d.	£1,183 8 10
8,400 gallons crude naphtha made at average price 6.69d.	234 3 0
	£1,417 11 10
Working Costs—Water Used.	
Town supply, 259,520 gallons at 8d. per 1,000 galls.	£8 13 0
Railway or well water, 995,310 galls. at 2d. per 1,000 galls.	8 5 10
Steam Consumption.	
Recovery plant, 1,230,075 lb. at 1/- per 1,000 lb.	61 10 0
Scrubber engine, 8,361 hours at 100 lb. per hour = 836,100 lb. at 1/- per 1,000 lb.	41 16 0
Wash Oil Used. 2,501 gall. at 4.7d. per gall.	48 19 6
Repairs.	
Labour	15 10 5
Material	13 0
Maintenance.	
Supplies, oil, &c.	22 1 9
	£207 9 6
Average receipts per gallon of residual products made	9.37d.
Working costs per gallon of residual products made	1.93d.
Net profits per gallon of residual products	7.44d.

Distribution of Sulphur in Coal after Carbonizing.

Average sulphur content of coals used (Blairhall, Kingarth, Lumphinnans) = 1%
Or 1 ton of coal contains 22.4 lb. sulphur = 156,800 grains.

Yields of Products per Ton of Coal.	*Sulphur Content of Production per Ton Coal.* Lb.	Grains.
Coke.—7.61 cwt. per ton coal. Sulphur = 1.32% = 11.25 lb.	11.25 = 50.22%	78,750
Gas.—16,500 cu.ft. per ton coal. H_2S expressed as sulphur—		
Crude gas at inlet to purifiers. 400 grains/100 cu.ft. =	9.43 = 42.10%	66,000
Organic sulphur—purified gas 8 grains/100 cu.ft.	0.183 = 0.81%	1,280
Tar.—17 gallons per ton coal. Sulphur = 305 grains /gallon	0.741 = 3.31%	5,185
Ammoniacal Liquor.—65 gallons per ton coal.		
Sulphur = 65 grains/gallon.	0.603 = 2.69%	4,225
Unaccounted for	.193 = 0.87%	1,360
	22.400 = 100%	156,800

The organic sulphur content of gas quoted above—*viz.*, 8 grains per 100 cu.ft.—is further reduced by benzole stripping (wash oil process) to an average of 4.5 grains per 100 cu.ft.—a reduction of 44%.

Electro-Detarrer Plant

When attention was given to the wet purification plant it was already known that the Livesey washer and Holmes brush scrubber were being overworked by an overload of almost 20%. Efficient washing and scrubbing of the gas was not taking place in these circumstances.

The main trouble was tar fog, which was carried forward in the gas stream into the purifiers, and fouled through time the top layer of oxide of iron. This tar fouling of the oxide was overcome to a large extent by a 6 in. layer of fine coke breeze being placed on the top of the oxide. The fine breeze arrested the tar fog and was removed after a period. This, however, was only a half-measure, for the following reasons:

(*a*) The washer and scrubber were still unable to remove the tar fog.
(*b*) Extra labour was required to remove the fouled breeze and renew.
(*c*) Tar was being lost as a valuable by-product.
(*d*) The tar content of the spent oxide of iron was still 5%.

It was therefore decided to install an electro-detarrer plant, after an examination of the merits of such a plant, which are summarized as follows:

(*a*) The capital cost was comparable with the cost of an extra washer scrubber complete with steam engine drive.
(*b*) On investigation, the reliability of working and maintenance charges were satisfactory.
(*c*) By total elimination of tar fog the existing washer and scrubber could be utilized solely for ammonia extraction.
(*d*) The back-pressure thrown by the plant is low, only ⅛ in. W.G.

A special point arose as to the most desirable position in the sequence of gas purification of the detarrer plant. The plant was placed at the outlet of the exhausters and inlet to Livesey washer, as it was felt that no useful purpose would be achieved by placing it prior to the condensers, even if ground space had permitted.

In this way the treater was designed to deal with 2 million cu.ft. of gas at 60° F., the normal temperature of the gas at the outlet of the exhausters. A much larger plant would have been necessary had it to deal with a hot gas. It might also be expected that it would be all to the good for an exhauster to deal with clean coal gas free from tar fog, but this is not so, since a standard design of exhauster depends to a great extent upon the light hydrocarbon oils in the gas, which are removed by the detarrer, for a proportion if its lubrication.

Comparison of Working of a Gas-Works making 300 Million cu. ft. per annum With and Without Benzole Recovery

NO BENZOLE RECOVERY.

Coal carbonized. (Make 18,000 cu.ft. per ton)	16,670 tons	£16,670 0 0	*Per ton.* 20/-
	Total yields per annum.	*Gross receipts per annum.*	
Coke made. (Saleable—8 cwt. per ton coal)	6,680 tons	£7,715 0 0	(22/6)
Crude tar. Made—17 gall. per ton coal	283,390 gall.	2,597 14 10	2.2 d. per gallon.
Sulphate of Ammonia. Made—35 lb. per ton coal carbonized	260 tons	1,560 0 0	£6 per ton.
Crude Benzole and Naphtha. Recovered—2.5 gall. per ton coal			
Total receipts for residuals per annum		£11,672 14 10	

Percentage Return of Residuals on Cost of Coal per annum—70%.

With Benzole Extraction	£15,437 1 5
Without ,, ,,	11,672 14 10
Difference	£3,764 6 7
Deduct extra coal	2,255 0 0
Difference in favour of benzole extraction	£1,509 6 7

BENZOLE RECOVERED.

	£ s. d.
18,925 tons—cu.ft. per ton, 15,850	£18,925 0 0
	Gross receipts per annum.
Total yields per annum.	
8,043 tons (8.5 cwt. per ton)	£9,048 7 6
321,725 gall.	2,949 2 11
294 tons	1,764 0 0
47,310 gall. (8.5d. per gall.)	1,675 11 0
	£15,437 1 5

Percentage Return of Residuals on Cost of Coal per annum—81.6%.

(To be continued in a forthcoming issue)

Leamington is to have its British Restaurant, which will open and in use towards the end of the present month. We are pleased to learn from Mr. R. S. Ramsden that the Corporation have ordered solid-fuel ovens fitted up for alternative firing by town gas, and have arranged for an alternative supply of gas-heated hot water to be provided.

NOTE.—The above data for income of Coke, Tar, and Sul/Ammonia is gross in each case, while the benzole income is net after deduction of costs, but not capital charges Sums for Coal, Coke, Tar, and Sul/Ammonia are subject to deduction of costs for additional labour, retort maintenance, &c.

RUBBER JOINTS FOR GAS MAINS

AT a recent meeting the Standing Technical Committee of the National Gas Association of Australia directed that further information on the use of rubber joints for cast-iron mains should be given to members. A Technical Service Letter recently issued deals with the subject, emphasizing the importance of correct selection of quality of rubbers used. We reproduce the following from the letter:

Although the use of rubber joints dates from 1847, it was not until 1927 that thorough investigations were undertaken in Belgium and France to ascertain the reasons for deterioration in use. Since that time, the work of Chappuis, Mailhe, Brabant, Bastien, and Wolff has clarified the position and shown broadly which types of rubber are suitable.

In 1933 the Distribution Committee of the Association Technique de l'Industrie du Gaz en France initiated a series of large scale tests on rubber joints in mains located at Clichy, Cornillon, Gennevilliers, Marseilles, Algiers, and Nantes. Some of the mains were raised for inspection in 1935 and again in 1937. These tests are proceeding and no final conclusions have, in consequence, been published.

No Standard Specification for rubber joints appears to have been issued in France or Belgium, but the following extracts from translated articles are worthy of mention:

"Gas freed from benzole has no perceptible effect on new rubber.

"Under the action of gas containing benzole, rubber expands considerably, brightens in colour, and has a more porous texture; the flexibility or elasticity of the gum becomes greater owing to the substance losing its hardness.

"The presence of benzole in the gas seems to have the effect of maintaining the tightness of the joint by preventing the rubber from contracting or drying.

"Under the action of gas containing benzole followed by gas freed from benzole, the rubber which had swelled and absorbed benzole releases the latter which tends to evaporate completely. This phenomenon is accompanied by a considerable loss in volume. It is probable that the joint—especially when the rubber, after prolonged action by the gas containing benzole, has lost its elasticity—loses contact with the pipe."

("The Question of Rubber Joints"—translation of article by M. Brabant, published in *Journal des Usines a Gaz*, Jan. 20, 1935.)

" Mailhe's first research work was with 17 specimens of new rubber joints from various sources; the complete chemical composition of each is given (pure gum, resins, 'factices,' total sulphur, free sulphur, sulphur of vulcanization, and mineral substances with all their compounds). In each case two specimens were tested—one compressed, the other not compressed—these being submitted in the same conditions to the action of benzole, gas containing benzole, and pipe water.

"After careful examination of the tested specimens, Mailhe set aside two specimens and made the following deductions in regard to rubber joints:

"1. Resins constitute a defect and make the rubber liable to corrosion. They would be much less dangerous were the rubber vulcanized more thoroughly.

"2. The 'factices' (artificial resins or *factises*) behave like gum which they help to replace.

"3. The gum plays the part of mortar, binding together the mineral matter. Except for one specimen having 65% gum, an excellent rubber, under-vulcanized, rich in mineral matter, poor in resin and factices, the best specimens it appears are those in which the gum. content is not very high (25 to 35%) providing that it is not vulcanized.

"4. Mineral substances play the part of stones cemented by the gum. Among the mineral substances MgO and PbO are not favourable. $CaCO_3$ with MgO are to be rejected. Among the best is ZnO improved by the addition of lampblack."

("A Study of Rubber Joints"—M. Edmond Bastien, Engineer and Director, Compagnie du Gaz de la Region de Charleroi, Belgium; reprinted in *Journal des Usines a Gaz*, Sept. 20, 1935.)

"The Committee wished to enlarge its study on the subject of gas-pipe joints and to examine in particular the materials capable of replacing rubber. Thus the Committee has been led to investigate what has been done both in France and in other countries in regard to the use of synthetic rubber or asbestos for the manufacture of pipe joints. It has learned that, save for a few exceptions, in Great Britain and the United States, synthetic rubber has not yet been used in a practical manner.

"At the same time the Committee has followed the tests conducted by several gas companies on asbestos joints; the only conclusion that can be drawn is that if after about 18 months' service the joints, once inspected, appear nearly intact, the duration of the test seems really insufficient for definite conclusions to be reached."

(Tests on Rubber Joints—Report of the Distribution Committee to the 61st Congress of the Gas Industry in France, June 14–18, 1938.)

Although considerable attention has been devoted in the U.S.A. to the types of cast-iron joints with which single or double rubber rings may be used, the American Gas Association does not appear to have issued any Specification dealing with the characteristics of rubber suitable for joints in gas mains.

Presumably influenced by Continental investigations and their own experience, British authorities in January, 1938, were responsible for the issue of B.S. No. 772, "British Standard Specification for Rubber Joint Rings for Gas Mains." Since this publication may be purchased in Australia it is unnecessary to deal in detail with the specification, which lays down the limits pertaining to hardness, swelling, ageing, &c.

The acetone extract of the rubbers, composed mainly of free sulphur, resins, and any oils or solid hydrocarbons, is limited to 7% by weight.

Metropolitan Gas Company's Specification

The British Standard Specification (No. 772) was issued in 1938, but in the preceding year the Metropolitan Gas Company had decided to adopt a specification for the supply of rubber rings for 4-in. and 6-in. cast-iron pipes. This specification is similar to the British specification with certain exceptions which the Company agreed upon with representatives of rubber companies.

The following extracts are taken from the specification at present used by the Metropolitan Gas Company:

Rubber rings for C.I. pipes.—The rings shall be formed of solid rubber truly circular in cross-section, and shall be of the following dimensions:

Nom. dia. of pipe. in.	Inner dia. of ring. in.	Outer dia. of ring. in.	Dia. of rubber forming ring. in.
4	4¼	5⅛	⅜
6	6⅜	7⅜	⅜

Ingredients.—The raw rubber shall be clean first-grade wild or plantation Hevea rubber, the acetone extract of which shall not exceed 3.5% by weight. This rubber shall form not less than 75% by volume of the compounded material, and no scrap, reclaim or crumb rubber, rubber substitute, or cork shall be employed. The remainder may consist of sulphur, mineral matter, carbon black, and suitable organic substances—*e.g.*, accelerators and anti-oxidants—at the discretion of the manufacturer, but no lead, manganese, copper, or any other substances shall be present.

If required by the engineer, tests for the determination of acetone extract shall be carried out in the manner described in Appendix 111 of British Standard Specification No. 486–1933 and the cost of such testing shall be borne by the Company.

Construction and workmanship.—The rings shall be separately vulcanized in moulds. The surfaces of the rings shall be plain, smooth and free from air marks and other blemishes with the fin or mould work reduced to a reasonable minimum. The material of the rings shall be homogeneous and free from porosity, as judged visually on the free surface or on any section.

Ageing.—Before being tested the material shall be heated in air at 70°C.±1°C. (158°±1.8°F.) for ten days.

Permanent set.—The diameter of a ring, or the marked length on a portion cut from a ring, shall, after stretching and recovery as described below, be not more than 5% in excess of the original diameter or marked length. The whole ring, or any 3-in. length of it, shall be stretched to three times its original mean circumference or length, and so maintained for a period of 15 minutes. One hour after being released, the diameter of the ring or the marked length of the portion stretched shall be remeasured. During the whole test the material shall be at a temperature of 15°C. to 25°C. (59°–77°F.), care being taken that it is not exposed during any part of the test to direct radiation from the sun or from local sources of heat.

Hardness.—The hardness shall be between 100 and 140, these numbers signifying the depression in hundredths of a millimetre of a ¼-in. diameter steel ball applied to a flat piece of material not less than 9 mm. (0.35 in.) thick nor 10 mm. (0.39 in.) in length, breadth, or diameter, and under a load of 1 kg. (2.20 lb.), maintained for one minute. The flat test pieces may be transverse sections of the ring resting on a circular face, or cuttings having the curved surface buffed flat over an area of approximately ½-in. by ½-in., the latter form of test piece being preferable.

Water absorption.—If required by the engineer, a test for water absorption of the material of the rings shall be made and the cost of such testing shall be borne by the Company. The material of the rings when tested in the manner described in Appendix IV of the British Standard Specification No. 486–1933 shall not absorb more than 3% (by volume) of water.

Tests.—All tests are to be made at the works of the contractor in the presence of the engineer or his deputy. One in each 500 of the rings shall be selected by the distribution superintendent for test, and should any ring fail to comply to his satisfaction with the specified requirements, the batch represented will be rejected. The distribution superintendent may apply to any or to all rings at his discretion any other tests which he may deem desirable to prove that the rings comply with this specification. Each ring which fails will be rejected. No payment will be made for any rings rejected.

References to Continental Literature

On p. 331 is a list of articles published in German, French, and Swiss journals, dealing with rubber joints or substitute jointing materials for gas pipes:

Date and page.	Title and Author.	Notes.
	Das Gas-und Wasserfach.	
1935: 260	New Jointings for Cast-iron Socket Pipes. (H. Heyd)	General survey of jointing improvements in recent years.
1935: 774	New Jointings for Cast-iron Socket Pipes. (H. Heyd)	Supplementary to above: Deals in detail with three kinds of rubber-packed joints—screw-socket, "roll-ring" and collar types. Many diagrams and photographs.
1936: (supplement to Jan. 11)	On lead-saving connexions with particular reference to screw socket pipes. (H. Walter, VDI)	Deals with various types of joints in use in England, France, U.S.A., Germany. Excellent diagrams of 14 joints.
1936: 249	Rubber as jointing material for cast-iron socket pressure pipes for gas and water systems. (K. Wagenfuhrer)	General discussion of rubber and its use in joints. Rubber is especially suitable for both gas and water pipes, new methods of production assuring long life. Synthetic rubber still a doubtful quantity.
1936: 592	On a new home-produced material for packing socket joints. (H. Voght)	"Sinterit" is a form of plastic iron used for packing joints. Details of preparation and use are given, with photographs.
1936: 677	Socket pipe connexions with rubber roll-joints. (M. Kootz)	Brief historical notes on use of rubber joints for iron sockets, since 1847.
1936: 849 873 891	Steel pipe and its joints. (Dr. Collorio)	By an Order issued 24.iv.1935 by the German Dept. controlling Base Metals the use of lead for socket joints was prohibited. Dr. C. claims this Order will "help to smooth the path to progress." Lengthy article discusses welded joints, caulking material—aluminium wool, &c. rubber (pp. 853-55), vulcanization and testing of rubber, &c., Many diagrams and illustrations.
1937: 12	Experiments with new kinds of pipe connexions	Review of article by Drobek in *Gaz*, 1936, 12-16. Tests with "Sinterit" were outstanding.
1937: 62	Testing of rubber: Standard specifications	New standards for hardness and tension of soft rubber (no particulars given).
1938: 344	DIN-DVM 3508—Testing of rubber: artificial ageing	The Rubber Testing Committee of the DVM has issued details of this test for artificial ageing in an air-furnace (Geer process), and in the oxygen bomb (Bierer-Davis process), laying down conditions and setting out value of tests.
	Swiss "Monatsbulletin."	
1938: 136 160 184	Materials used for pipe-lines. (M. G. Levi, C. Giordani, B. Demonco, G. Monti.). (Italian Gas & Water Assoc.)	Report presented to the 3rd (1937) Congress of the International Gas Union. Cast-iron pipes, with spec. ref. to lead and rubber joints, pp. 138-141 (June); steel pipes—soldered and other joints, pp. 160-164; asbestos-cement pipes, 164-166 and 184-188 (July and Aug.). Diagrams of joints.

Date and page.	Title and Author.	Notes.
	Journal des Usines a Gas.	
1935: 31	The Question of Rubber Joints. (M. Brabant.)	Republished from *Belgian Gas Assoc. Bulletin*: a survey of recent research, &c. Special ref. to effect of benzole-free and benzole-containing gas on rubber joints; types of joints used (with illustrations).
1935: 145	Notes on a New Joint of Asbestos Braid for existing Cast-iron Pipes. (Translation available.)	Brief note on asbestos braid strengthened with bronze wire; method of fitting, &c. A recent and unproved device.
1935: 480	A Study of Rubber Joints. (Edmond Bastien.)	Republished from *Belg. Bulletin.* Experiences of Belgian gas-works supplying coke oven gas after manufactured gas had been used; great increase in losses; prevention methods; choice of pipes and joints; qualities of rubber. (Well illustrated.)
1936: 481	The "Secur" collar and joint for underground gas mains. (M. E. Berriat.)	Description of new type of clamping collar using rubber ring for use on branch pipes (with diagram).
1937: 21	Substitutes for lead packing in pipe joints. (Translation see *National Gas Bulletin*, Aug., 1937, p. 16)	Review of article by E. Landel (Stuttgart gas-works) in *G.W.F.*, 1936 : 145. As a result of extensive tests described in detail, Stuttgart adopted aluminium foil for joint packing. The original article is well illustrated.
1937: 90	Rubber as jointing material for cast-iron gas and water mains	Review of article by K. Wagenfuhrer in *G.W.F.*, 1936 : 249.
1938: 242	Tests on Rubber Joints; Report of Distribution Committee, 61st Congress of French Gas Industry, June, 1938.	Extracts from Committee's report on tests conducted in France during last two years. Tests were made on three qualities of rubber, fitted with and without protection, in actual service.
1938: 251	New systems of flexible jointings for underground pipes and valves. (M. E. Berriat). Presented at 61st Congress of French Gas Industry, June, 1938	Summary of paper dealing with pipe and valve connexions—the "Perflex" sleeve connexion; the "Isoflex" device for insulation against stray currents by means of rubber rings, &c. The "Metastandard" joint for socket pipes (with rubber rings). Diagrams are given.
1938: 324	Comments and discussion on above paper by M. Berriat	Use of lead shields in conjunction with rubber rings recommended; extensive tests reported in progress.
1939: 263	Contribution to the Study of Rubber Joints for Gas Pipes. (P. Wolff.) Résumé of Communication to 62nd Congress of French Gas Industry, June, 1939	Working conditions of the rubber joint. Action of hydrocarbons in gas. Tests on rubber mixtures—laboratory, acceleration, and in gas pipes.
1939: 262	The Attack of Rubber by Gas Condensates. (L. G. Sabrou and A. Marty.) Résumé of a Communication to the 62nd Congress of French Gas Industry, June, 1939	Attack on rubber by condensates. Discussion on debenzolizing and pipe joints.

NEW PATENTS

Gas Washing Apparatus

Improved means for use in conjunction with gas washing apparatus of the Livesey type constitute the object of a patent (No. 537,676; application date, Aug. 2, 1940) taken out by R. & J. Dempster, Ltd., and J. W. Scott.

In the empty chambers of a Livesey washer, above the water-level, finely-divided filtering means is provided adapted, when it is traversed by the gas or vapour bubbling through the washing liquid, to perform a mechanical stripping action upon the tar and other impurities entrained therein, the arrangement of such filtering means being such that the gas or vapour is compelled to pass through the interstices thereof before passing to the chamber-outlet.

In one embodiment of the invention, as applied to a Livesey washer adapted for use in the manufacture of coal gas, each of the chambers enclosed above the perforated tubular plates is provided with a stripping brush, formed by bristles suitably affixed to a length of wire in substantially cylindrical form, the bristles being of sufficient length to fill the chamber and to dip into the washing liquid therein. The ends of the bristle carrier may conveniently be suspended by hook-bolts or the like from an extension of the upper part at each end thereof, so as to lie more or less axially in the chamber, with the bristles projecting radially into contact with each wall and the top.

Where such a bristle brush is used in the adaptation of existing Livesey washing apparatus, it will be necessary, in order that the bristles may be sufficiently long to reach the top of the chamber, for the lateral bristles to be crushed together somewhat where they impinge against the side-walls. In the manufacture of new apparatus in accordance with this invention, however, the side-walls may advantageously be bulged longitudinally at positions opposite the central axis of the brush, so as to accommodate the lateral bristles without crushing.

Other forms of stripping material—e.g., metal or slag wool, wood shavings, or the like—may be utilized in lieu of the bristle brushes, the material actually installed in any particular washing apparatus being chosen so as best to suit the requirements of the gas or vapour under treatment.

Whatever form of stripping material be employed, it will be so arranged as to be prevented from choking the perforations in the upper parts of the tubular plate through which the gas or vapour enters the chamber. Further, care should be taken to ensure that the stripping material is not so tightly packed in the chambers as to raise the pressure therein.

Control of Gas Supply to Internal Combustion Engines

A patent (No. 537,032; application date, Dec. 4, 1939) concerned with the control of gas and air supply to internal combustion engines has been granted to the Gas Light and Coke Company, W. J. Inman, and J. Cross. It relates to an improvement in or modification of the invention set forth in the specification of Patent No. 432,051. The device is of the kind in which a piston element is axially movable in a cylinder, is arranged to be influenced by the suction of the engine, and is arranged both to effect relative movement between a metering pin and a gas port and to control an air port or ports, which gas and air ports communicate with a mixing chamber.

An automatic control device of the kind referred to above is characterized in that the piston element is hollow and is provided with a port or set of ports which are arranged progressively to cover and uncover an air port or ports in the cylinder when the piston is moved axially, and in that means are provided for effecting relative rotational adjustment between the piston and cylinder so as to vary the extent of overlap of the co-operating ports in a circumferential direction, whereby the ratio of the air to gas in the mixture may be adjusted.

In one constructional form of the invention, the hollow piston is provided with a second port or set of ports and a space is formed between the cylinder and the piston which, for all positions of the piston, maintains the second port or set of ports in permanent communication with the outlet side of the gas port controlled by a metering pin.

In an alternative form of construction, instead of the hollow piston being provided with a second set of ports, a gas conduit may be arranged

(*Continued on p. 334*)

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Gas Products Prices

The London Market

Aug. 25.

The prices of Coal Tar Products in the London market remain at approximately the following levels:

Pitch is nominal; creosote 4¾d. to 5d.; refined tar 3¾d. to 4d.; pure toluene under the Ministry of Supply Toluene No. 2 Order 2s. 5d.; pure benzole 1s. 10d.; 95/160 solvent naphtha 2s. 5d. to 2s. 8d., and 90/160 pyridine about 13s. 6d.; all per gallon naked; refined crystal naphthalene £23 per ton in bags; all *ex* Makers' Works.

The Provinces

Aug. 25.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 1s. 10d. (controlled by the Control of Toluene No. 2 Order, July 5, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North, 10d. to 11d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha North, 1s. 6d. to 1s. 7½d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¼d. to 4¾d.; Scotland, 4¼d. to 4¾d.; low gravity, 4½d. to 4¾d. Fuel Grade, 4d. to 4¼d. Carbolic acid, 60's, 3s. 7½d. to 3s. 9d. Naphthalene, £12 to £15. Salts, 70s. to 80s., bags included. Anthracene, "A" quality, 4½d. to 4¾d. per minimum 40% purely nominal. Heavy oil: Unfiltered anthracene oil (min. gr. 1,080), 5¼d. to 5½d.; filtered heavy oil (min. gr. 1,080), 5¾d. to 6d.; heavy anthracene oil gr. less than 1,080, 6d. to 6¼d.

*In regard to pitch and crude tar prices we would ask readers to refer to the editorial note in our issue of Sept. 4, 1940, p. 404.

Tar Products in Scotland

GLASGOW, Aug. 23.

Spot business is not too active, but deliveries are proceeding rapidly against contract. Prices are well held.

Refined tar is commanding 4¾d. to 5d. per gallon for delivery in the home market and round 3½d. per gallon for export, both f.o.r. naked.

Creosote oil: Production is moving steadily, mostly against long term contracts, with values as under: Specification oil, 5¾d. to 6d. per gallon; low gravity, 6½d. to 7d. per gallon; neutral oil, 6d. to 6½d. per gallon; all *ex* Works in bulk.

Cresylic acid is not too plentiful locally and values are firmer as under: Pale, 99/100%, 3s. 9d. to 4s. per gallon; Pale, 97/99%, 3s. 5d. to 3s. 8d. per gallon; Dark, 97/99%, 3s. to 3s. 3d. per gallon; all *ex* Works in buyers' packages.

Crude naphtha is unchanged at 6½d. to 7½d. per gallon *ex* Works in bulk, according to quality.

Solvent naphtha 90/160 grade is 1s. 8½d. to 1s. 9d. per gallon, and 90/190 Heavy Naphtha is 1s. 4½d. to 1s. 5½d. per gallon.

Pyridines are without interest at about 14s. per gallon for 90/160 grade and 16s. per gallon for 90/140 grade.

The Directors of The Gas Light and Coke Company and of the South Metropolitan Gas Company have decided that consideration of the accounts of the Companies shall be deferred until the accounts for the year 1941 as a whole are available. In the meantime no announcement can be made with regard to dividends on the capital stocks of either Company.

Gas Stocks and Shares

Markets on the whole opened quietly last week, but strong features were provided by the gilt-edged and home rail sections. As the week progressed, however, the tenseness of the Russian war situation caused a general easing-up in the volume of business and a number of prices closed fractionally lower. The little profit-taking in evidence was chiefly confined to the home rail market. In the industrial section most of the leaders suffered a moderate setback, while oil shares became reactionary.

The volume of business in the Gas Market was not so heavy as during the past few weeks, although support was forthcoming for the stocks of the larger undertakings. The only increase of note was a sharp rise of 8 points in Bournemouth maximum stock to 122½. Several other minor improvements took place but there were no falls. It will be seen below that a number of issues are now quoted *ex div.*

The statement issued by the Directors of the three Metropolitan Companies that consideration of the accounts is deferred until the full year's figures are available, and that in the meantime no announcement can be made with regard to dividends, will doubtless not come as a surprise to many. It will be remembered that no preference or final ordinary dividends were paid by these undertakings for the December half-year 1940, and the current statement implies that the preference dividends for the half-year to June, 1941, will not be disbursed when due.

The following price changes took place during the week:

OFFICIAL LIST

Barnet District Ord. (*x.d.*)	112—117	Aug. 18
Bournemouth max.	120—125	+8
Bristol Ord.	68—73	+½
Commercial 5 p.c. Deb. (*x.d.*)	87—92	Aug. 18
East Surrey "B" (*x.d.*)	65—70	"
Gas Light 3½ p.c. max.	50—55	+2
" 5 p.c. Red. Deb.	103—106	—
" 4½ p.c. Red. Deb.	101—104	—
Imperial Continental	63—68	+1
Portsmouth Cons. (*x.d.*)	88—93	Aug. 18
Southampton Ord. (*x.d.*)	50—55	"
Swansea 5½ p.c Red. Pref. (*x.d.*)	88—93	"
Tottenham Ord. (*x.d.*)	70—75	"
" 5 p.c. Pref. (*x.d.*)	78—83	"
United Kingdom Gas Corporation Ord.	12/—14/-	+1/-
Uxbridge Ord. (*x.d.*)	80—90	Aug. 18
Wandsworth 4 p.c. Deb.	77—82	+2

SUPPLEMENTARY LIST

Cheltenham Ord. (*x.d.*)	85—90	Aug. 18
East Surrey 5 p.c. Pref. "A" (*x.d.*)	85—90	"
" 6 p.c. Cum. Pref. (*x.d.*)	90—100	"
Hampton Court Ord. (*x.d.*)	67—72	"
North Middlesex 5 p.c. Pref. (*x.d.*)	75—80	"

PROVINCIAL EXCHANGES

Weston-Super-Mare Ord. (*x.d.*)	78—82	Aug. 11
Sheffield Cons.	109—111	+1
Great Grimsby "A" (*x.d.*)	155—165	Aug. 11
" " "B" (*x.d.*)	155—165	"
" " "C" (*x.d.*)	145—155	"
" " Ord. (*x.d.*)	14—18	"
Liverpool Ord.	92—95	+1
Preston "A" (*x.d.*)	155—165	Aug. 11
" "B" (*x.d.*)	113—123	"

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Temporary address:
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East Englia
OCT 13 1941

to extend into the interior of the hollow piston through a hole in a closed wall of the piston so as to provide a good sliding fit between these parts, and the metering pin may be secured in the open end of said piston, so as to co-operate with the end of the gas supply conduit and control the flow of gas therethrough.

Fig. 1 is a side elevation of the control device; fig. 2 is a section on the line 2—2 of fig. 1; fig. 3 is a plan view of fig. 1; and fig. 4 is a similar view to fig. 2 of an alternative form of construction.

The device comprises an upright cylindrical casing 10 open at the top and in which is reciprocably mounted a hollow piston element 11 closed at its lower end. The lower end of the casing is enlarged so as to provide an annular space 12 between it and the lower part of the

Fig.1. Fig.2. Fig.4.

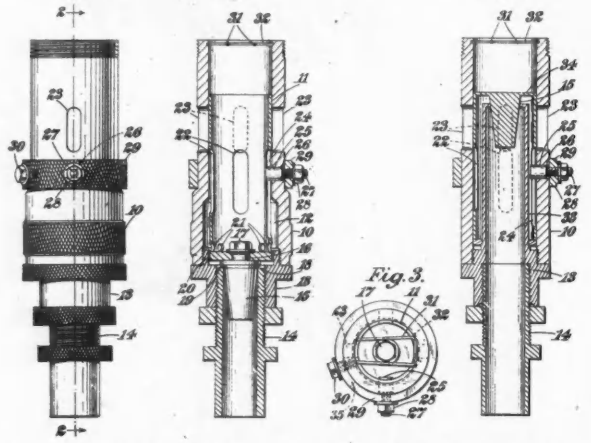


Fig.3.

piston element. Secured to the lower end of the casing is an adaptor 13 which is externally threaded at one end to engage an internally threaded part of the enlarged lower portion of the casing and is internally threaded for the greater part of its length to receive a connexion 14 for the gas supply. Secured to the lower end of the piston element is a centrally disposed metering pin 15 which is in the form of a taper plug which extends into the connexion and is provided with a threaded stem 16 clamped by a nut 17 to the piston element. The connexion is provided with a comparatively sharp internal peripheral edge 18 at the upper end and the metering pin is provided with a conical valve face 19 which is arranged to engage the sharp edge when the piston is at the lower limit of its travel. When in this position the lower part of the piston extends into a comparatively small bore 20 in a part of the adaptor so as to provide a narrow annular space between these parts. The cylindrical wall of the piston element is provided with a number of circular ports 21 near the closed end and with a number of axially extending slots 22 and 24 arranged approximately mid-way between the top and bottom of the piston element and arranged to co-operate with a similar number of slots 23 in the wall of the casing. One of the slots 24 in the piston element is longer and extends to a lower level than the others and is engaged by a pin 25 arranged in a circumferential slot 26 in the wall of the cylinder. The outer end 27 of the pin is screw-threaded and is clamped by a nut 28 to a ring 29 which encircles the casing. Thus, by rotating the ring, the required amount of circumferential overlap of the ports may be obtained. The ring may be fixed in a desired position by a setscrew 30 which extends through a slot 35 in the ring and engages a threaded hole in the casing, the head of the setscrew serving to clamp the ring. The slots in the wall of the casing are so positioned that when the piston element is at the lower extremity of its travel, the two sets of slots just overlap.

The upper extremity of the casing is externally threaded for connexion with a part of the induction system of the engine and in order to prevent the piston element from being sucked beyond the end of the casing, a U-shaped spring clip 31 is arranged within a circumferential groove 32 in the end of the casing so as to extend across the interior thereof. When the casing is employed in an upright position, the weight of the piston element is sufficient to move it into a closed position, but should the casing be arranged horizontally, a compression spring could be employed for that purpose.

In an alternative form of construction, the cylinder 10 is provided with a straight inner cylindrical surface throughout the length thereof and the gas supply conduit or an extension 33 of the adaptor 13 is arranged to extend in a good sliding fit through a hole in the closed bottom of the piston 11. Secured to the upper end of the piston by a spider member 34 is the metering pin 15 which is arranged to co-operate with a sharp circumferential inner edge of the extension 33. The ports 22 and 24 in the piston and the ports 23 in the casing are arranged in a similar manner to that described with reference to the first construction, as is also the means for effecting relative rotational adjustment between the piston and the cylinder.

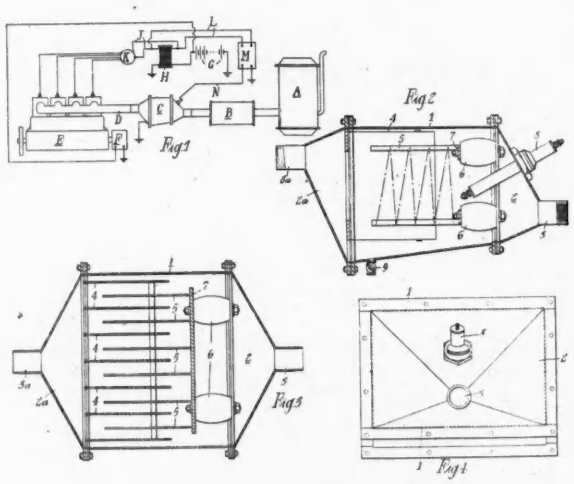
Mobile Gas Producer

W. C. Holmes & Co., Ltd., E. M. Lake, F. B. Holmes, and W. Sykes have been granted a patent (No. 537,644; application date, Dec. 28, 1939) relating to portable gas producer plants adapted for use in the propulsion of vehicles. The desirability of treating the gases arising in such producers in order to effect the removal therefrom of solid and also liquid particles has been recognized, and a variety of filtering or cleaning elements have been used or proposed to be used for the purpose. A difficulty in connexion with such cleaning elements as have previously been used or proposed to be used, state the patentees, arises from the resistance which they expose to the gas in its passage from the producer to the engine.

This invention is based upon the observation that for the purpose in question it is possible to employ an electrostatic precipitator of relatively small size and operated from a source of power available on the vehicle. A portable gas producer plant according to the invention comprises an electrostatic precipitator, to the electrodes of which direct current at an appropriate high voltage is supplied from a source of direct current on the vehicle. The storage battery and dynamo provided for the lighting system on the vehicle may be employed as a source of power for producing direct current at the necessary high voltage. To this end, the direct current from the storage battery and dynamo system provided on the vehicle may be applied through an interrupter or vibrator to a transformer, the secondary of which is connected with a rectifier, the output of which in turn is connected with the electrodes of the electrostatic precipitator. The transformer and interrupter may be the coil and interrupter which is the source of high tension current for the ignition system or it may be of similar construction but provided with windings having a ratio differing from that of the coil forming part of the ignition system. The rectifier employed may be of the mechanical or thermionic valve type. Preferably, the electrostatic precipitator is so formed as to promote the flow of the gas in a sinuous or tortuous path through the chamber, and preferably to promote the flow of the gases in a helical path with respect to the connecting electrodes. The insulator for the electrode above earth potential is preferably of the form described in Specification No. 500,545 and the general construction and arrangement of the electrodes as well as other constructional features may be as described therein.

Fig. 1 is a diagram representation of a gas producer associated with an electro-static precipitator to which electrical energy is supplied indirectly from the dynamo and battery which is the source of supply of current for the ignition system of an internal combustion engine. Fig. 2 is a sectional elevation. Fig. 3 is a section plan view, and fig. 4 an end elevation of an electrical precipitator for use with gas producers in accordance with the invention and as shown in fig. 1.

In the drawings, referring to fig. 1, A is a gas producer, B is a cooler and preliminary dust separator, C is the electrical precipitator, D a gas manifold leading to an internal combustion engine E, which, in addition to being arranged to propel a vehicle, is, as is customary, furnished with a dynamo F, supplying energy to batteries G, and to an induction coil H connected by leads J to the distributor K, and by leads L to a step-up transformer and rectifier unit M which is connected by a lead N to the electrical precipitator C, the other lead from the rectifier being earthed.



The construction of a precipitator in accordance with the invention may be seen more clearly from figs. 2 to 4. The body of the precipitator comprises a chamber formed by an intermediate portion 1 furnished with end members 2 and 2*a*, one of which is provided with a gas inlet 3 and the other with a gas outlet 3*a*, the body of the precipitator being arranged at earth potential.

Within the body of the precipitator there is arranged a plurality of electrodes 4 in electrical connexion with the shell of the precipitator, and a further set of electrodes 5 associated with insulators 6 which are in mechanical connexion with a support 7 arranged within the precipitator chamber. To these electrodes electrical energy is supplied by way of the insulated lead in 8.

As will be seen, the body of the precipitator is tapered or its bottom portion is inclined in a direction away from the inlet end and at, or near the lowest point of the bottom portion of the precipitator there is provided a valve 9 by which any condensed liquid may be discharged.